SAMARIN, A.M.; NOVIK, L.M., kandidat tekhnicheskikh nauk; GONCHARENKO, N.I., kandidat tekhnicheskikh nauk; TREGUBENKO, A.F., inzhener.

Vacuum treatment of molten metal. Stal' 16 no.8:700-707 Ag '56. (MLRA 9:10)

1.Chlen-korrespondent Akademii nauk SSSR (for Samarin).
(Steel--Metallurgy)

SAMARIN, A.M.

Utilizing vacuum techniques in ferrous metallurgy (conference in the A.A.Baikov Institute of Metallurgy). Vest.AN SSSR 26 no.6:137-140 Je '56. (MIRA 9:9)

1.Chlen-korrespondent AN SSSR.

(Steel--Metallurgy)

SAMARIN, A.M.

Immediate tasks in the study of electric furnace steel smelting processes. Sbor. Inst. stali no.35:5-11 '56. (MIRA 10:8)

1. Kafedra elektrometallurgii. Chlen-korrespondent AN SSSR.
(Steel--Electrometallurgy)

SAMARIN, A. M.

KALINNIKOV, Ye.S., kandidat tekhnicheskikh nauk; SAMARIN, A.M.

Effect of temperature and the technology of smelting roller-bearing steel on the content of nonmetallic inclusions. Sbor. Inst. stali no.35:290-297 '56. (MIRA 10:8)

1. Kafedra elektrometallurgii. 2. Chlen-korrespondent AN SSSR (for Kalinnikov).
(Bearing metals) (Steel--Defects)

SAMARIN, A.M.

YASKEVICH, A.A., dotsent, kandidat tekhnicheskikh nauk; FILIPPOV, A.F., dotsent, kandidat tekhnicheskikh nauk; SAMARIN, A.M.

Lamination of chromium-nickel alloys in thin sheets. Sbor. Inst. stali no.35:320-326 '56. (MIRA 10:8)

1. Kafedra elektrometallurgii. 2. Chlen-korrespondent AN SSSR (for Samarin).

(Steel--Defects)
(Chromium-nickel alloys--Metallography)

SAMARIN, A.M.; KARASEV, R.A.

Use of radioactive isotopes in metallurgy. Priroda 45 no.12:14-19 D '56. (MLRA 10:2)

1. Chlen-korrespondent Akademii nauk SSSR. (for Samarin).
(Radioisotopes--Industrial applications)
(Metallurgical research)

SAMARIN, A.M.; SVET, D.Ya.

On modulation reflectometry of molten metals. Dokl.AN SSSR 108 no.1:79-81 My '56. (MLRA 9:8)

1. Chlen-korrespondent AN SSSR (for Samarin); 2. Institut metallurgii imeni A.A. Baykova Akademii nauk SSSR.
(Pyrometry) (Physical metallurgy)

CARD 1 / 2 PA - 1548

SUBJECT USSR / PHYSICS
AUTHOR LINČEVSKIJ,B.V., SAMARIN,A.M.
TITLE The Oxidation of Manganese which was Dissolved in Liquid Iron.
PERIODICAL Dokl.Akad.Nauk, 110, fasc. 2, 209-211 (1956)
Issued: 11 / 1956

The present work deals with the results obtained when determining the equilibrium of the solution of manganese in iron with a mixture of steam and hydrogen at 1565 and 1605°. The fact that equilibrium is established is ascertained by the appearance of an oxide film on the surface of the metal. Results are considered to be satisfactory if the position of the film on the metal remains steady for a period of from 5 to 10 minutes.
In a diagram (abscissa lg(% Mn), ordinate $lg(P_{H_2O}/P_{H_2})$ the dependence of the oxidation potential of the gaseous phase of the manganese content in the solution is represented. A further diagram shows the dependence of the composition of the oxidation products of manganese on the manganese content in the solution. In the case of a manganese content of more than 1,8% the following reaction takes place: $MnO_{sol}+H_{2(gas)}=H_2O_{(gas)}+[Mn]$, $\Delta F_1^0 = 72.150 - 36,83\ T$, $lg\ K_1 = -(15570/T) + 8,05$. For the experiment the thermodynamic functions of the interaction reaction of the steam with the liquid iron are determined. By adding the values obtained on this occasion to those just mentioned, the reaction equation of the oxidation of the manganese dissolved in iron is ob-

Dokl.Akad.Nauk, 110, fasc.2, 209-211 (1956) CARD 2 / 2 PA - 1548

tained: $MnO_{sol} = [Mn] + [O]$, $\Delta F_3^0 = 115600 - 57,42\ T$, $\lg K_3 = -25270/T + 12,65$. The dissociation pressure of manganous oxide at 1600° is $P^{1/2}_{O_2(r)} = 4,57 \cdot 10^{-7}$ atm.

The investigation of non-metal inclusions, of the particles of the oxidation products of manganese and of the products deposited in the course of the anodi dissolution of the metal confirms the correctness of the conclusions arrived at. If the concentration of the manganese in the solution is increased, the particles of the inclusions become finer, and round particles become polygonal. At high concentrations of manganese dendrite-shaped inclusions occur. Several photographs show the particles of various inclusions. At moderate manganese concentrations liquid solutions with an increased content of ferrous oxide are formed on the occasion of the concentration of the molten metal. If the concentration of the manganese is increased, the composition of the oxide inclusions corresponds to the two-phase domain of the state diagram of the system MnO - FeO. Within this domain liquid and solid particles can form simultaneously. In the case of a considerable increase of the manganese content only solid solutions which do not melt easily, are created, or else the pure manganous oxide is precipitated from the solution. In the course of the chemical examination of the oxidation products of manganese it was found that they contain 98,2% manganous oxide. X-ray analysis furnished the lattice parameter a = 4,43.

INSTITUTION:

SAMARIN, A.M., OKOROKOV, G.N., POLYAKOV, A.YU.

"Influence of the Arc Vacuum Remelting on Properties of Steel and Alloys," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6 , 1957

SAMARIN, A..M., BUZHEK, Z.

"Desulphurization of Steel in Electric Arc Furnaces," lecture given at the Fourth Conference on Steelmakin, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

SAMARIN, A.M., LEVENETS, N.P.

"Investigation of the Oxygen Refining of the High Phosphor Pig-Irong in Small Capacity Converters,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

SAMARIN, A.M., VERTMAN, A.A.

"Measuring of Electric Conductivy and Viscosity of Metal Melts," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallrugy, Moscow, July 1-6, 1957

SAMARIN, A.M., FEDOTOV, V.P,

"Solubility of Nitrogen in Iron Melt and Silicon,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

SAMARIN, A.M., MCHEDLISHVILY, V.A., LYUBIMOVA, G.A.

"Interaction of Sulphur and Mananese in Solid Iron," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1 - 6, 1957

SAMARIN, A.M., KASHIK, I.,

"Influence of Carbon, Manganese and Silicon on Desulphurization of Liquid Iron in Vacuum,"
lecture given at the Fourth Conference on Steelmakin, A.A. Baikov Institute of Metallurgy, Moscow, July 1 - 6, 1957

SAMARIN, A.M., AVERIN, V.V., POLYAKOV, A.Yu.

"Solubility and Activity of Oxygen in Liquid Alloys of Fe-Ni-Co," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscwo, July 1 - 6, 1957

SAMARIN, A.M., GARNYK, G.A.

"Carbon Influence on Some Properties of Transformer LSteel," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

SAMARIN, A.M., DIMANT, OB., LUKASHEVICH-DUVANOVA, Yu.T.

"Structure of Non-Metallic Inclusions and Oxide Films in Ferrochrome Alloys," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

SAMARIN, A.M., KARASEV, R.A.

SAMARIN, A.M.

"Equilibrium of Reaction of Liquid Iron Decarbonization at Lower Pressure," lecture given at Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July - 1 - 6, 1957

SAMARIN, Aleksandr Mikhaylovich; POLYAKOV, Aleksandr Yul'yevich; NOVIK, Lev Moiseyevich; GARNYK, Galina Antonovna; ROZENTSVEYG, Ya.D., redaktor izdatel'stva; VAYNSHTEYN, Ye.B., tekhnicheskiy redaktor

[Use of vaccum in steel smelting] Primenenie vakuuma v staleplavil'nykh protsessakh. Pod red. A.M.Samarina. Moskva, Gos. neuchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1957. 101 p. (MIRA 10:7)

1. Chlen-korrespondent Akademii nauk SSSR (for Samarin)
(Smelting)

SAMARIN, A. M.

STENON, Nikolay [Steno, Nicolaus]; STRATANOVSKIY, G.A. [translator]; BELOUSOV, V.V., redaktor; SHAFRANOVSKIY, I.I., professor, redaktor; PETROVSKIY, I.G., akademik, redaktor; ANDREYEV, N.N., akademik, redaktor; BYKOV, K.M., akademik, redaktor; KAZANSKIY, B.A., akademik, redaktor; SHCHERBAKOV, D.I., akademik, redaktor; YUDIN, P.F., akademik, redaktor; DELONE, P.N., redaktor; KOSHTOYANTS, Kh.S., redaktor; ~~SAMARIN, A.M.,~~ redaktor; LEBEDEV, D.M., professor, redaktor; FIGUROVSKIY, N.A., professor, redaktor; KUZNETSOV, I.V., kandidat filosofskikh nauk, redaktor; ZAYCHIK, N.K., redaktor izdatel'stva; SMIRNOVA, A.V., tekhnicheskiy redaktor

[A solid body enclosed by nature within a solid. Translated from the Latin] O tverdom, estestvenno soderzhashchemsia v tverdom. Perevod G.A.Stratanovskogo. Redaktsiia, stat'i i primechaniia V.V.Belousova, i I.I.Shafranovskogo. [Leningrad] Izd-vo Akad.nauk SSSR, 1957. 150 p. (MIRA 10:10)

1. Chlen-korrespondent Akademii nauk SSSR (for Belousov, Delone, Koshtoyants, Samarin)
(Geology)

SAMARIN, A.M., otvetstvennyy redaktor; TSYLEV, L.M., professor, doktor, redaktor; VOSKOBOYNIKOV, V.G., doktor tekhnicheskikh nauk, redaktor; OSTROUKHOV, M.Ya., kandidat tekhnicheskikh nauk, redaktor; CHERNOV, A.N., redaktor izdatel'stva; KISELEVA, A.A., tekhnicheskiy redaktor

[Investigation of blast furnace processes] Issledovanie domennogo protsessa. Moskva, 1957. 255 p. (MLRA 10:4)

1. Akademiya nauk SSSR. Institut metallurgii.
2. Chlen-korrespondent AN SSSR (for Samarin)
(Blast furnaces)

SAMARIN, A.M., otvetstvennyy redaktor; BANKVITSER, A.L., redaktor izdatel'stva; RZHEZNIKOV, V.S., redaktor izdatel'stva; CHERNOV, A.N., redaktor izdatel'stva; SOMOROV, B.A., tekhnicheskiy redaktor.

[Physicochemical principles of steel production; transactions of the third conference on physical and chemical elements in steel production (January 24-29, 1955)] Fiziko-khimicheskie osnovy proizvodstva stali; trudy III konferentsii... Moskva, Izd-vo Akad.nauk SSSR, 1957. 799 p. (MIRA 10:6)

1. Konferentsiya po fiziko-khimicheskim osnovam proizvodstva stali. 3d, 1955. Chlen-korrespondent AN SSSR (for Samarin).
(Steel--Metallurgy)

SAMARIN, A.M.

137-58-5-9133

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 55 (USSR)

AUTHOR: Samarin, A.M.

TITLE: Vacuum Reduction and Desulfurization of Transformer Steel (Raskisleniye i desul'furatsiya transformatornoy stali v vakuume)

PERIODICAL: V sb.: Primeneniye vakuuma v staleplav. protsessakh. Moscow, Metallurgizdat, 1957, pp 3-14

ABSTRACT: An account of experiments dealing with smelting of transformer steel in a vacuum-type induction furnace of 20 kg capacity equipped with a magnesite crucible. An optimal technology of smelting is described; it consists of the following steps: the charge containing 0.05-0.07% C is smelted in air; up to 0.1% of Fe ore is introduced for the purpose of oxidizing the impurities; to enhance desulfurization and dephosphorization a slag is introduced which consists of a mixture of aluminum powder and lime; after draining off the slag, the furnace is evacuated. It is established that the rate of decarbonization is a function of the capacity of the furnace. The disparity in amounts of C and O withdrawn from the metal is noted. It is assumed that a portion

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137-58-5-9133

Vacuum Reduction and Desulfurization of Transformer Steel

of the O removed has formed compounds with S and Si. The formation of CO_2 is also possible in the range of small concentrations of C. It is pointed out that the degree of desulfurization increases with diminishing concentrations of O_2.

A. V.

1. Steel--Desulfurization 2. Steel--Purification

Card 2/2

Samarin, A.M.

137-1958-3-4645

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 3, p 26 (USSR)

AUTHORS: Averin, V. V., Polyakov, A. Yu., Samarin, A. M.

TITLE: Activity of Oxygen in Liquid Iron (Aktivnost' kisloroda v zhidkom zheleze)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 201-219, Diskus. pp 332-334

ABSTRACT: On the strength of a survey of data in the literature, the Authors contend that the partial pressure values of O_2 over its saturated solution in Fe, established earlier, do not coincide with experimental values of dissociation pressure in liquid FeO. The reaction of liquid Fe with the gaseous phase $H_2 + H_2O$ was investigated for known values of the ratio $p_{H_2O} : p_{H_2}$. A diagram of an experimental installation is shown. After a preliminary heating to 1000°, a steam-hydrogen mixture was introduced into a reaction furnace, where it was heated to the temperature of the metal (M). Temperatures were measured by means of an optical pyrometer. Samples of M were withdrawn frequently during the smelting process. After every withdrawal, the con-

Card 1/3

Activity of Oxygen in Liquid Iron

ditions of equilibrium (the temperature and the composition of the gaseous phase) were altered and new samples of M were again taken. From a charge of 70-80 g three to four samples weighing 10-15 g each would be taken. Owing to vigorous separation of the hydrogen, the crystallization of the little ingots was accompanied by effervescence. In order to reduce the partial pressure of H_2, Ar was added to the gaseous mixture. When the O_2 content exceeded 0.1 percent, the surface of the ingot in contact with the crucible became covered with a shiny oxide film. During the solidification of M a portion of the oxygen left with the escaping hydrogen while another portion was deposited on the walls of the crucible together with the waste materials. When smelting was conducted with Ar, the consumption of H_2 and Ar constituted 255 ml/min and 700 ml/min, respectively. Results of experiments in which Fe was saturated with oxygen at temperatures of 1551°, 1574°, 1597°, 1621°, and 1645° closely coincide with known data on the solubility of oxygen in Fe under a layer of liquid, ferruginous slag. Equilibrium constant of the reaction between liquid Fe and the steam-hydrogen mixture is established as a function of temperature:

137-1958-3-4645

Activity of Oxygen in Liquid Iron

$$H_{2(2)} + [O] = H_2O_{(2)}; \quad k = 1/[\%\ O]\ f_O \cdot p_{H_2O}/p_{H_2};$$

$$\log k = 9440/T - 4.536$$

It is established that the magnitude of the coefficient of activity of oxygen in liquid Fe is a function of both the temperature and the oxidation potential of the gaseous phase, and is expressed by the equation:

$$f_O = 1 - (2.51 - 1.19 \cdot 10^{-3}\ T)\ (p_{H_2O}/p_{H_2})^2, \text{ where}$$

$$f_O = a_O / [\%\ O].$$

B. L.

Card 3/3

SAMARIN, A. M.

137-1958-1-226

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 1, p 35 (USSR)

AUTHORS: Levenets, N.P., Samarin, A.M.

TITLE: An Investigation of the Oxidation of Phosphorus Dissolved in Molten Iron (Issledovaniye okisleniya fosfora, rastvorennogo v zhidkom zheleze)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 226-224, Diskus. pp 332-334

ABSTRACT: An investigation of the equilibrium of the oxidation of P in molten Fe was conducted in the presence of the gaseous phase $H_2 + H_2O$. A drawing of an experimental apparatus for the study of the state of equilibrium in the gas-metal-oxide system is adduced. A study was made of non-metallic impurities when the P content of the metal was 0.02-3%. The effect of P on the solubility of O in liquid Fe was determined. A quantitative evaluation of the deoxidizing capacity of P is offered. In liquid Fe containing up to 1.2% P, the product of P oxidation is an Fe phosphate, and the reaction is as follows: $2[P] + 8[O] + 3Fe_{(liq)} \rightleftharpoons (FeO)_3 P_2O_{5(liq)}$ $\Delta F^o = -383,500 + 142.6\ T$; $\log K = 84,200/T - 31.1$. When the P content of the Fe exceeds 1.2%, P_2O_5 is formed along

Card 1/2

An Investigation of the Oxidation of Phosphorus (cont.)

with the Fe phosphate, and the reaction may be described by the equation: $4[P] + 13[O] + 3\,Fe_{(liq)} \rightleftharpoons (Fe\,O)_3\,P_2O_{5\,(liq)} + [P_2O_5]$; $\Delta F^o = -531{,}000 + 266.5\,T$; $\log K = 118{,}000/T - 58.2$. The P dissolved in the liquid Fe causes a slight reduction in the coefficient of activity of the O. The effect of P on the activity of the O dissolved in the liquid Fe is determined by the equation:

$$\log f_O^P = -0.044\,[\%P].$$

The O dissolved in the molten Fe also reduces the coefficient of activity of the P to an insignificant degree. The effect of the O on the activity of the P dissolved in the liquid Fe is determined by the equation

$$\log f_O^P = -0.0852\,[\%O].$$

I.P.

1. Iron (Liquid)--Oxygen solubility--Effects of phosphorus 2. Phosphorus--Oxidation reactions 3. Oxygen solubility--Analysis

Card 2/2

SAMARIN, A.M.

137-1958-1-214

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 1, p 33 (USSR)

AUTHORS: Lyaudis, B. K., Samarin, A. M.

TITLE: Determination of the Deoxidizing Capacity of Titanium (Opredeleniye raskislitel'noy sposobnosti titana)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 245-256. Diskus. pp 332-334

ABSTRACT: The starting substances are described, problems having to do with the reaction of the oxides in the deoxidizing element and the crucible are discussed, as are matters pertaining to the nature of the non-metallic impurities. The thermodynamic characteristics of the reactions occurring upon reaction of Ti and O in liquid Fe are discussed. Melts were run in BeO crucibles, which had proved to be the best suited to this purpose. An investigation was made of the deoxidizing capacity of Ti in the 0.005 - 0.5 percent interval. It was found that the following reactions were dominant when the liquid Fe contained up to 0.04 percent Ti: $[Ti] + 4[O] + 2\,Fe_{liq} = 2\,FeO \cdot TiO_{2(liq)}$. $\Delta F^o = -294{,}000 + 107.3\,T$, while at Ti content of 0.04 - 0.05 percent the dominant reaction was $[Ti] + 2[O] + TiO_2(solid)$

Card 1/2

137-1958-1-214

Determination of the Deoxidizing Capacity of Titanium

$\Delta F^{o} = -140{,}500 + 47.3\ T$. As a deoxidizer, Ti lies between Si and Al. The effect of Ti dissolved in liquid Fe upon the activity of O and TiO_2 was determined.

B. L.

1. Titanium--Deoxidizing effects--Determination 2. Iron (Liquid) --Chemical reactions

Card 2/2

SAMARIN, A.M.

137-58-5-8882

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 19 (USSR)

AUTHORS: Mikiashvili, Sh. M., Tsylev, L. M., Samarin, ~~A. M.~~

TITLE: Fusion Properties of the $MnO-SiO_2-Al_2O_3$ System (Svoystva rasplavov sistemy $MnO-SiO_2-Al_2O_3$)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 423-432. Diskus. pp 505-512

ABSTRACT: Viscosity of slags containing 5-30% Al_2O_3, 10-55% SiO_2, and 20.7-75% MnO was studied; a viscosity diagram for this system was constructed at 1500°C together with its pseudobinary discontinuities at 1400°, 1500°, and 1590°. The most fluid slags (0.5-2 poise at 1500°) are those which contain 18-48% SiO_2, 50-75% MnO, and 0-25% Al_2O_3. Smallest viscosity is exhibited by slags in which the concentration ratio MnO/Al_2O_3=6 and the SiO_2 content is under 40%. The viscosity of these slags varies very little with temperature. An increase in SiO_2 concentration produces a sharp increase in viscosity. Petrographic investigations revealed that fused slags contain tephroite, rhodonite, spessartine, manganosite, galaxite, cristobalite, and glass. The surface tension, σ_1, of low carbon steel and of slags of the sys-

Card 1/2

137-58-5-8832

Fusion Properties of the MnO-SiO_2-Al_2O_3 System

tem under investigation was determined by the method photographing a drop lying on a flat surface. Between temperatures of 1500° and 1595° the σ Fe amounts to 1306-1310 dynes/cm. The σ_{slag} becomes greater with increasing MnO content but is reduced by the presence of Al_2O_3 and SiO_2. The σ_{slag} is only slightly affected by temperature and, depending on the composition of the slag, varies between 280 and 670 dynes/cm. The magnitudes of the interphase tension between the slag and Fe were computed by measuring the marginal contact angle between a drop of liquid slag and a drop of liquid Fe, as well as by employing the σ values obtained. The magnitude of the interphase tension varies from 800 to 1160 dynes/cm. Replacing MnO by SiO_2 and Al_2O_3 produces an increase in interphase tension. The results obtained are explained in the light of ionic theory of slags.

I. T.

1. Slags--Viscosity 2. Slags--Properties

Card 2/2

SAMARIN, A.M.

137-58-2-4125

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 265 (USSR)

AUTHORS: Garnyk, G.A., Samarin, A.M.

TITLE: The Effect of Certain Admixtures on the Properties of Transformer Steel (Vliyaniye nekotorykh primesey na svoystva transformatornoy stali)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 560-569. Diskus. pp 650-655

ABSTRACT: A study was made of two groups of heats of a transformer steel smelted in a high-frequency furnace. One group was smelted in accordance with the generally accepted procedure for this type of steel; the other was smelted in a 5-15 mm Hg vacuum and was subsequently vacuum-cast. The steel of the vacuum heats was found to contain 50 percent less C, 80-90 percent less O, approximately 85 percent less H, and a considerably smaller quantity of nonmetallic inclusions than the steel from the ordinary heats. Hence, the plastic, magnetic, and electrical properties of the former are superior.

T.F.

Card 1/1

1. Steel--Properties 2. Steel--Inclusions 3. Steel--Production--Methods

137-1958-2-2334

SAMARIN, A.M.

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 18 (USSR)

AUTHORS: Mozgovoy, V.S., Samarin, A.M.

TITLE: The Solubility of Nitrogen in Chromium-Carbon, Chromium-Iron, and Chromium-Iron-Carbon Melts (Rastvorimost' azota v rasplavakh khroma i ugleroda, khroma i zheleza, khroma, zheleza i ugleroda)

PERIODICAL. V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 586-589. Diskus. pp 650-655

ABSTRACT: The following base materials were studied: Electrolytic Fe (0.02% C, 0.02% Mn, 0.015% S), Cr (1.04% Fe, 0.6% Al, 0.2% Si, 0.15% N), and a Cr with a C content of up to 8.0%. The following was ascertained: When the C content of the Cr-C melts was increased, the solubility of N decreased. When the Fe content of the Cr-Fe melts was increased, the solubility of N decreased. When the Cr content of the Cr-Fe melts was decreased from 97 to 70%, the C content remaining unchanged, the solubility of N decreased by one-half. In the Cr-Fe-C melts, the solubility of N decreased as the temperature increased. In the Cr-Fe-C melt the dependence of the solubility equilibrium constant of N on the

Card 1/2

137-1958-2-2334

The Conditions of the Formation and Dissociation of the Sulfates (cont.)

interfere with the formation of the sulfates, and it did not contribute to the decomposition of the sulfates caused by the considerable surplus of free ZnO. Unless the ZnO is fully sulfatized, the ferrites and silicates are not decomposed by the sulfur dioxide. For the sulfating roasting of the Zn concentrates to be thorough, a unidirectional-flow roasting method had to be used, so that the gases from the roasting came into contact with the roasted ash, which contained no Zn sulfides.

N.P.

1. Zinc sulfates--Formation--Analysis 2. Cadmium sulfates--Formation --Analysis

Card 2/2

SAMARIN, A.M.

137-1958-1-394

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 1, p 62 (USSR)

AUTHORS: Mchedlishvili, V. A., Samarin, A. M.

TITLE: Variation in Nonmetallic Inclusions During the Process of Melting and Pouring Steel Deoxidized by Manganese and Silicon (Izmeneniye nemetallicheskikh vklyucheniy v protsesse plavki i razlivki stali, raskislennoy margantsem i kremniyem)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 650-655

ABSTRACT: Variation in [O] and in nonmetallic inclusions in the metal from the moment of deoxidation to the finished rolled product was investigated in twelve heats of 36G2S and 20P steel in a 130-t open hearth furnace. Deoxidation in the furnace was by Si-Mn grades 17 and 20, 500-700 kg for 20P steel and 2.0-2.5 t for 36G2S, and the heats were left there for 10-12 and 15-25 minutes, respectively, with deoxidation in the ladle by 45% Fe-Si and by Al, 800 and 500 kg/t, respectively, until the specified analysis was attained. The nonmetallic inclusions segregated from the steel by electrolysis were subjected to microcrystalloscopic, spectroscopic, and petrographic investigation, in addition to which

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Variation in Nonmetallic Inclusions During the Process of Melting (cont.)

heat tinting was used to determine the nature of sections thereof. It was found that, prior to deoxidation, solidified steel with 0.021% [O] contains only oxysulfides of Fe with a small amount of Mn in solution in the liquid steel. After deoxidation and before pouring, two types of nonmetallic inclusions were found in the steel: highly dispersed particles of FeS with a little MnS, and droplet silicates -- chiefly manganese orthosilicates of Ca, containing more than 10% Ca, more than 10% Si and Mn, and less than 10% Fe. It is observed that [O] diminished to 0.0081 in 36G2S steel at the moment of pouring owing to flotation of the nonmetallic inclusions, while in 20P the figure was only 0.0154%. This is to be explained by the fact that in the second case the steel was not left in the furnace long enough for uniform distribution of Si Mn. Three types of nonmetallic inclusions were found in ladle samplings: highly-dispersed Fe and Mn sulfides, particles of corundum, droplet silicates, and silicate glass containing corundum crystals, more of the latter being found in 20P than in 36G2S steel. Specimens taken from the finished steel showed corundum crystal particles, chiefly in the 20P steel, and elongated Mn-AlFe-Ca silicates with MnS in solution or as films. The diminution in [O] found to occur during the pour -

Variation in Nonmetallic Inclusions During the Process of Melting (cont.)

to 0.0039 for 20P steel and to 0.0038% for 36G2S steel is explained by the flotation of nonmetallic inclusions out of the liquid steel in the molds and runner boxes. It is noted that the oxides and sulfides existing separately in liquid steel, the latter being in solution, form complex oxysulfides during the cooling of 6-t ingots and in heating for rolling, all the S being absorbed to form MnS.
Bibliography: 12 references A.Sh.

1. Steel--Impurities--Analysis 2. Steel--Deoxidation--Test results 3. Manganese--Applications 4. Silicon--Applications 5. Steel--Manufacture

SAMARIN, A.M.

137-1957-12-23409

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 83 (USSR)

AUTHORS: Samarin, A. M., Novik, L. M.

TITLE: The Treatment of Liquid Steel Under Vacuum in Ladles and Molds (Obrabotka zhidkoy stali pod vakuumom v kovshe i izlozhnitse)

PERIODICAL: Tr. In-ta metallurgii. AN SSSR, 1957, Nr 1, pp 39-50

ABSTRACT: A description of industrial experiments, conducted in 1952-1954, on the process of treating liquid steel in a ladle or a mold under vacuum. Steel, placed into a 16 t ladle covered by a vacuum hood, was kept in the ladle for 12-14 minutes under a vacuum of 70-140 mm; metal placed into molds was kept there for 25-30 minutes. Rimming bessemer steel was subjected to working in vacuum (VW). After VW the O decreased 4-10-fold, i.e., down to 0.0044-0.0053 percent, and the N was reduced by 30-50 percent. The treatment in vacuum ensured uniformity in the chemical composition of the ingot, particularly with respect to S and O. After a period of exposure in a vacuum-furnace the bessemer steel acquires a high a_k and preserves it down to a temperature of -60°. The welding seams retain their strength down to -40 - 60°. The a_k of the bessemer steel, after it has been treated

Card 1/2

137-1957-12-23409

The Working of Liquid Steel Under Vacuum in Ladles and Molds

in vacuum, is in the range of 12-30 kg/cm^2. The threshold of cold-shortness for steel which has been treated under vacuum in a ladle is about -30° to -50° and 0-30° after exposure in a vacuum furnace, whereas the threshold of cold-shortness for plain steel lies around 0-20°. After aging, the a_k of the vacuum treated steel is small; this is attributed to a large content of O (0.013-0.015 percent).* The system developed by the authors is capable of servicing 5-7 furnaces.

B. L.

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* Translator's Note: The meaning of this sentence, in the Russian original, is obscured by a discontinuity of one or more lines in the type form.

1. Liquid steel treatment-Vacuum processes

Card 2/2

SAMARIN, A.M.

137-58-3-6018

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 3, p 225 (USSR)

AUTHORS: Samarin, A. M., Garnyk, G. A.

TITLE: The Effect of Vacuum Melting on Properties of Transformer Steel (Vliyaniye vyplavki pod vakuumom na svoystva transformatornoy stali)

PERIODICAL: Tr. In-ta metallurgii AN SSSR, 1957, Nr 1, pp 51-59

ABSTRACT: Laboratory smeltings of 10 and 20 kg batches of transformer steel were tested and investigated, together with semi-industrial smeltings weighing 150 kg which were smelted in a vacuum-type induction furnace at a residual pressure of 1-2 mm Hg. A portion of the ingots solidified without vacuum. Ingots forged into 100 mm squares were rolled into strips 0.32 mm, 0.2 mm, and 0.08 mm thick. It is established that H_c and wattage losses in vacuum-melted steel are considerably lower than in standard steels whereas magnetic permeability in weak and, partially, in medium magnetic fields is significantly higher; this is explained by lower gas content and by the fact that non-metallic inclusions are present in amounts 88 to 90 percent smaller than in standard steels and, in addition, appear in the form of readily fusible

Card 1/2

137-58-3-6018

The Effect of Vacuum Melting on Properties of Transformer Steel

silicates, rather than in the form of fine alumina crystals as is the case in standard melts. Vacuum-melted steel containing up to 4.12 percent Si is suitable for cold rolling, a fact which may be utilized to effect additional reduction of losses due to eddy currents. V. M.

Card 2/2

SAMARIN, A.M.

137-1958-1-323

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 1, p 49 (USSR)

AUTHORS: Samarin, A.M., Vertman, A.A.

TITLE: Production of Chromium and Carbon-free Ferrochrome by Vacuum Sintering (Polucheniye khroma i bezuglerodistogo ferrokhroma metodom vakuum-spekaniya)

PERIODICAL: Tr. In-ta metallurgii AN SSSR, 1957, Nr 1, pp 60-66

ABSTRACT: It is shown theoretically that reduction of Cr oxides requires only heating to 1350°-1400° in 1 mm Hg vacuum. The effects of temperature, pressure, and other factors on the deoxidation rate of Cr oxide are studied. At 1320°, reduction ends after 2-2.5 hrs. Evaporation of Cr increases at higher temperatures. Higher rates of evacuation of the gaseous reaction products promotes completion of the process (which does not take place at higher pressures). The use of a deoxidizer of higher reactivity, such as carbon black, makes it possible to reduce the process temperature. The pressure employed in briquetting has no effect whatever on the rate of deoxidation. It is hypothesized that the deoxidation of chromic oxide by carbon occurs in two stages: reaction of oxide and CO, and regeneration of CO_2. The deoxidation of the chromic oxide occurs

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Production of Chromium and Carbon-free Ferrochrome (cont.)

at the phase contact surface and is governed by the equation $\alpha = 1 - \exp(-kt^n)$, α being the degree of deoxidation, t the time, and k and n proportionality factors. To obtain Cr, briquetted chromic oxide and C were heated in the graphite crucible of a vacuum induction furnace to 1400° for 2 hours at 1 mm Hg. After the sintering the C content did not exceed 0.07-0.05%. The composition of the Cr obtained by this thermal carbon process differs little from electrolytic Cr. Extensive possibilities for the production of carbon-free Fe-Cr by this method are indicated, as is the possibility of its employment in the production of stainless steel in which $C < 0.03\%$.

B.L.

1. Sintered chromium--Production 2. Chromium--Processing 3. Chromium-iron alloys--Production 4. Sintered chromium-iron alloys --Production

Card 2/2

SAMARIN, A. M.

Distr: 4E2c

Viscosity of Molten Slags of the System: Manganese Oxide–Silica–Alumina. Sh. M. Mikiashvili, A. M. Samarin and L. M. Tsylev. (Izvest. Akad. Nauk, S.S.S.R. Otdelenie Tekh. Nauk, 1957, (1), 115–122). (In Russian). The viscosity of molten slags of the system: MnO–SiO_2–Al_2O_3 corresponding in composition to the products of deoxidation of steel in the region of the lowest melting temperature was investigated. It was found that with increasing content of silica, the viscosity of homogeneously liquid slags increases and is determined mainly by the size of silicate anions. The viscosity of heterogeneously liquid slags at 1400–1590° C increases with decreasing silica content and is determined by the proportion of solid phase present. The lowest viscosity (0·5–10 poises) was observed for melts with $MnO : Al_2O_3 = 6$ and the content of silica from 20 to 30%. With decreasing $MnO : Al_2O_3$ ratio the viscosity of melts increases. An addition of alumina causes a slight increase in the viscosity of homogeneously liquid melts. The most fluid are melts with $MnO : SiO_2 = 2·6$ and containing up to 22% of alumina. With decreasing $MnO : SiO_2$ ratio, the viscosity of melts increases. An increase in the content of manganese oxide decreases the viscosity of homogeneously liquid slags. Melts of the lowest viscosity correspond in their composition to that of tefroite.

SAMARIN, A. M.

4E2C

11884* (Russian.) Solubility of Oxygen in Melts of Iron and Manganese. Rastvorimost' kisloroda v rasplavakh zheleza s margantsem. B. V. Linchevskii and A. M. Samarin. Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk, no. 2, Feb. 1957, p. 9-18.

Determination of solubility of Mn in liquid Fe. Mechanism of Mn oxidation. Oxygen activity in Fe-Mn melts.

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SAMARIN, A.M.

The effect of vanadium on the oxygen solubility in iron-carbon fusions. R. A. Karasev, A. Yu. P[illegible] and A. M. Samarin. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1957, No. 2, 146–50.—The exptl. results indicate that the V oxidation process during an after-blow in the V cast iron in a Bessemer converter differs radically from the process during the slow oxidation of the metal surface with the O of the air. During the slow oxidation C inhibits oxidation if present in excess of 0.446 (V%) (at 1400°). The O content in the metal from the beginning of V oxidation is detd. by its equil. relation to V present in the metal. However, when the metal is oxidized during the after-blow with either air or O, C does not inhibit the oxidation of V at low temp. The O concn. in the melt is much lower than corresponds to the given V content. During the after-blow at below 1400° V can be oxidized only on the gas-metal interface during vigorous stirring. All the factors which tend to increase the reaction surface between the oxidizer and the liquid metal, and to raise the O concn. in the bubbles of the gaseous oxidation must, therefore, favor the oxidation reaction in the molten cast iron. W. M. Sternberg

SAMARIN, A. M.

/Utilization of isotopes and radiation sources in the metallurgical industry7
Anwendung der radioaktiven Isotope und Strahlungsquellen in der Metallurgie.
Berlin, Neue Hütte, Zeitschrift für das Berg- und Hüttenwesen, 2/3, 1957, pp.69-76

SAMARIN, A.M.,

AUTHORS: Mikiashvili, Sh. M., Samarin, A.M. and Tsylev, L.M. (Moscow). 24-4-8/34

TITLE: Interphase tension at the boundary slag-iron and surface tension of melts of the system $MnO-SiO_2-Al_2O_3$. (Mezhfaznoye natyazheniye na granitse shlak-zhelezo i poverkhnostnoye natyazheniye rasplavov sistemy zakis' margantsa-kremnezem-glinozem).

PERIODICAL: "Izv. Ak. Nauk, Otd. Tekh. Nauk" (Bulletin of the Ac. Sc., Technical Sciences Section) 1957, No.4, pp.54-62 (USSR).

ABSTRACT: Popel, S.I., Esin, O.A. and Gel'd, P.V. (Dokl. Ak. Nauk, Vol.74, p.75, 1950) developed a method of direct determination of the interphase tension based on measuring the dimensions of the liquid drop of the metal in the slag by means of X-rays, since according to these authors calculation of the interphase tension at the surface of division of two liquid phases on the basis of the difference in the surface tension of these phases does not give reliable results for the system iron-slag. However, the use of the method of these authors is limited, due to the difficulty of selection of a refractory material for the crucible which is equally resistant to the chemical effects of the slag and the iron. The method of measurement of the interphase tension on the basis of the dimensions of the solidified metal drop in the slag yields very inaccurate results due to the appreciable deformation of the drop during the

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Interphase tension at the boundary slag-iron and surface tension of melts of the system $MnO-SiO_2-Al_2O_3$. (Cont.)
24-4-8/34

process of solidification (Leont'eva, A.A. "Kolloidnyi Zhurnal", No.11, 1949). The method used by the authors of this paper is based on determining experimentally the boundary angle θ of the melt drop at the surface of the liquid iron (see Fig.1) by means of the test set-up as shown in Fig.2; a graphite heated furnace of 45 mm inner dia., a corundum crucible of 40 mm dia. and 2.5 to 3 mm depth containing technically pure iron is placed on a magnesite base. After melting the iron a drop of the studied slag is fed onto the iron surface by means of a specially designed graphite tube (Fig.3). The determined values of the boundary contact angles for various slag compositions at temperatures of 1510 to 1540 C are given in Table 2. The determined surface tension values for various slag compositions of the system $MnO-SiO_2Al_2O_3$ are enumerated in Table 3. The graph, Fig.7, gives the interphase tension at the surface of sub-division of the melts of the system $MnO-SiO_2-Al_2O_3$ and the liquid iron, whilst the graphs, Fig.8, show the influence of substitution of silica for MnO on the interphase tension. It was found that substitution of MnO by silica leads to a considerable reduction of the surface tension; the silica is surface active at the boundary melt-gas. Addition of Al_2O_3 to the melts brings about, in the case of a constant

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Interphase tension at the boundary slag-iron and surface tension of melts of the system $MnO-SiO_2-Al_2O_3$. (Cont.)
24-4-8/34

$MnO:SiO_2$ ratio, some increase in the surface tension which also increases in the case of a constant MnO content. The temperature has little effect on the surface tension of the melts. From the obtained values of the surface tension of the phases and of the boundary contact angle, the values of the interphase tension at the boundary of the slag melts with the liquid iron were determined. Substitution of MnO by silica leads to a considerable increase of the inter-phase tension which also increases if the MnO is substituted by Al_2O_3. MnO appears to be surface active at the boundary iron-slag melt. A certain reduction of the interphase tension was observed in the case of substitution of silica by alumina. Addition of alumina into the melt in the case of a constant $MnO:SiO_2$ ratio brings about an increase of the interphase tension. There are 8 figures, 3 tables, 10 references, all of which are Russian.

Card 3/3

SUBMITTED: May 3, 1956.

AVAILABLE:

SAMARIN, A.M.

SAMARIN, A.M.; SHAPIRO, I.S.

Academician S.G. Strumilin; on the occasion of his 80th birthday. Vop. ist. est. i tekh. no.4:191-194 '57. (MIRA 11:1)
(Strumilin, Stanislav Gustavovich, 1877-)

SAMARIN, A.M.

AUTHORS: Garnyk, G. A. and Samarin, A.M. (Moscow). 24-5-9/25

TITLE: Vacuum metallurgy. Deoxidation and desulphurisation in vacuum. (Vakuumnaya metallurgiya. Raskisleniye i desul'furatsiya v vakuume).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Technicheskikh Nauk", (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.5, pp.77-84 (U.S.S.R.)

ABSTRACT: Utilisation of vacuum permits increasing the deoxidation property of carbon and thus to carry out the deoxidation solely by carbon and to produce steel which is free of deoxidation products and has a very low content of dissolved oxygen; this is particularly important for smelting steels with very low carbon contents. Very little information is available on smelting of steel in vacuum furnaces and, therefore, the authors aimed at studying the influence of vacuum on the decarburisation and desulphurisation during the manufacture of transformer steel in induction vacuum furnaces. The fact that it is advisable to apply vacuum furnaces for producing transformer steel was established earlier by Garnyk, G.A., (Dissertation, Institut Metallurgii Ak. Nauk SSSR, 1953). In the here described experiments the steel was produced in a laboratory vacuum induction furnace of

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Vacuum metallurgy. Deoxidation and desulphurisation in vacuum.
24-5-9/25
(Cont.)

20 kg capacity with a magnesite crucible. The current supply to the furnace was from a rotary generator of 50 kW, 2500 c.p.s. Armco iron containing 0.06 C, 0.18 Si, 0.25 Mn was used as starting material in addition to about 0.1% iron ore. On the basis of the obtained results and the data published by Fischer, W.A. and Cohen, Th. (2) the authors conclude that in the case of smelting of transformer steel in vacuum induction furnaces it is advisable to melt first the metallic charge in an open furnace, to add iron ore to it for intensifying the oxidation process, keep the liquid metal under a layer of slag for the purpose of purifying it of P and S and then to introduce ferrosilicon under vacuum. Under optimum conditions a reduction of the pressure in the furnace atmosphere to 1 mm Hg increases the deoxidation capacity of carbon almost one hundredfold. The speed of purifying the liquid metal in vacuum, of oxygen, is several times as high as the speed of elimination of carbon from the metal. The speed of deoxidation and decarburisation in vacuum depends not only on the initial concentrations of carbon and oxygen in the metal but also on the furnace capacity. Fig.2 shows the speed of decarburisation, in % C/min in vacuum

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Vacuum metallurgy. Deoxidation and desulphurisation in vacuum. (Cont.) 24-5-9/25

as a function of the initial C content in the metal for furnaces of 20 and 150 kg capacity. Fig.3 shows the dependence between the deoxidation speed and the initial oxygen content of the metal for furnaces of 20 and 150 kg capacity. Fig.4 shows the dependence between the speed of decarburisation and deoxidation in vacuum for furnaces of 20 and 150 kg capacity. Fig.5 shows the desulphurisation of the liquid metal in vacuum in a 150 kg capacity furnace, as a function of time, mins. Fig.6 shows the ratio of (S,%):(O,%) as a function of the deoxidation ability of the carbon for a 150 kg furnace.
There are 6 figures, 4 tables, 1 German and 1 Slavic reference.

SUBMITTED: June 6, 1956.

AVAILABLE:

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24-6-4/24

Extraction of vanadium from P-content pig iron. (Cont.)

temperature at the end of the blowing should not exceed 1250 to 1270 C. The phosphorus loss during the devanadation is small and does not exceed 4% of the original P-content; the concentration of P_2O_5 in the slags is 6 to 8%. It was shown that in iron containing 0.26 to 0.41% Si, the removal, during the first few minutes of blowing, of even 40% Si is inevitably accompanied by a simultaneous oxidation of about 35% of the vanadium present in the iron. With an initial vanadium content of 0.08 to 0.10% in the Kerch type of iron, such a loss of vanadium is intolerable. Hence in blowing of iron containing small amounts of vanadium, the only method which allows one to obtain slags containing not less than 3 to 3.5% V is the limitation of the silicon content to 0.25%, and the manganese content to 1%. Other results which were obtained are as follows. In the blowing of iron containing only 0.17% V it is possible to obtain slags containing up to 10% V, if the silicon content of the iron is a few hundredths of a percent and the manganese content is not more than 0.5%. If the iron contains 0.13 to 0.17% V, not more than 0.40% Si and 0.30 to 0.60% Mn, the slags contain 4.5 to 6.2% V. Tables 1 to 6 summarise such results in the various cases investigated. All the

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24-6-4/24

Extraction of vanadium from P-content pig iron. (Cont.)

results indicate that it is possible to obtain slags containing 3 to 3.5% V in blowing of phosphorous irons containing 0.08 to 0.10% V if:
the Si content is not more than 0.25% and Mn content not more than 1%;
a low temperature is maintained during the process of blowing;
SiO_2 and CaO are eliminated from the slag.
Methods whereby this can be achieved are briefly mentioned.
There are 2 figures, 7 tables and one Slavic reference.

SUBMITTED: November 29, 1956.

AVAILABLE:

Card 3/3

SAMARIN, A.M.

24-8-16/34

AUTHORS: Averin, V.V., Polyakov, A. Yu. and Samarin, A.M.(Moscow).

TITLE: Solubility and activity of oxygen in liquid iron, nickel, cobalt and their alloys. (Rastvorimost' i aktivnost' kisloroda v zhidkikh zheleze, nikele, kobal'te i ikh splavakh).

PERIODICAL: "Izvestiya Akademii Nauk,Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.8, pp. 120-122 (U.S.S.R.)

ABSTRACT: Wriedt, H.A. and Chipman, J. (1,3) and one of the authors of this paper (2) studied the solubility of oxygen in liquid melts of iron and nickel in the entire range of concentrations of the two components but they did not study the problems relating to the activity of the oxygen in liquid iron-nickel solutions. In this paper the solubility and the activity of oxygen are studied in the system Fe-Ni-Co by means of investigating the equilibrium between the metallic melt and the gaseous phase for a given value of oxygen activity. In liquid Fe-Co and Fe-Ni melts the oxygen saturation will have a minimum value for high contents of nickel and cobalt. In nickel and cobalt alloys there is no minimum oxygen solubility, however, even in these alloys no proportionality is observed between the saturated oxygen concentrations and

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Solubility and activity of oxygen in liquid iron, nickel, cobalt and its alloys. (Cont.)

the compositions. Change in the oxygen concentration in Fe-Ni and Fe-Co alloys shows no minimum at partial oxygen pressures in the gaseous phase below the value corresponding to those of saturated solutions. For obtaining saturated oxygen concentrations in alloys with high contents of Ni and Co magnitudes of oxidation potentials are required for the gaseous phase which exceed the respective values for iron. Of practical importance is the established fact that the transfer of oxygen from the gaseous phase into the metallic melt is lower for nickel or Co base melts than it is for iron base melts.
There are 4 graphs, 6 references, 4 of which are Slavic.

SUBMITTED: February 20, 1957.

SAMARIN, A.M.

AUTHORS: Buzhek, Z. and Samarin, A. M. (Moscow) 24-9-6/33

TITLE: Relation between the desulphuring and deoxidation of steel. (Zavisimost' mezhdu desul'furatsiyey i raskisleniyem stali)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1957, No.9, pp. 37-44 (USSR)

ABSTRACT: In earlier work one of the authors of this paper and O. K. Teodorovich (Ref.5) established that the processes of deoxidation of the slag and of desulphuring of the metal proceed simultaneously during the period of reduction of the metal. Since the content of ferrous oxide in the slag determines the content of oxygen dissolved in the metal, a reduction of the oxygen content in the liquid metal will be accompanied by removal of the sulphur from the metal into the slag. Since in the case of slow diffusion -deoxidation of steel baths the decrease in the content of sulphur in the metal proceeds relatively slowly, the authors investigated whether in the case of rapid "precipitation" deoxidation it would not be possible to speed up the removal of sulphur from the metal, the problem being to determine the influence of oxygen on the process of desulphuring and to clarify the mechanism of this process. The tests were carried out by means of a

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24-9-6/33

Relation between the desulphuring and deoxidation of steel.

40 kg capacity h.f. induction furnace with pre-heating of the slag. The metal charge had the following analysis: < 0.1% C, 0.04% Si, 0.34% Mn, 0.12% Cu, 0.11% Ni, 0.033% S, 0.022% P. A synthetic slag was used containing 15% Al_2O_3, 45% CaO and 40% SiO_2. Slag specimens were taken; the quantity of slag was 8% of the weight of the metal charge which was 35 kg. The results of deoxidation with aluminium on the process of desulphuring obtained for three melts are plotted in the graph, Fig.1; these show that desulphuring speeds up after introducing aluminium into the metal. The influence of the temperature on the speed of desulphuring is plotted in the graph, Fig.2. Table 1 gives data on the average speed of desulphuring in % of S/min from the metal during the first ten minutes after introducing the aluminium; for an equal quantity of aluminium an increase by 50% in the temperature increases the desulphuring speed threefold and an increase by 70°C increases the average desulphuring speed by about fivefold. The graph, Fig.3, shows the results of the changes in the sulphur and oxygen contents before and after introducing into the metal 0.5% Al, whilst the graph, Fig.4, shows the

Card 2/3

SAMARIN, A. M.

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Effect of deoxidation of steel with a silicomanganese alloy of an optimum composition on the properties of steel. V. A. Mchedlishvili and A. M. Samarin (Acad. Nauk U.S.S.R. Inst. Met. im. A. A. Baikova, Moscow). *Prace Inst. Ministerstwa Hutnictwa* 9, 93–124(1957)(English summary).—The optimum compn. of the Si-Mn alloy (I) for the deoxidation of steel in an open-hearth furnace is Mn:Si = 6. The deoxidized steel contains then less nonmetallic inclusions and less O than the steel deoxidized with common I. The above optimum compn. of I results also in better plastic properties of the deoxidized steel during rolling; the strength of such steel is only slightly better. The I alloys investigated were: (1) Mn 61.6, Si 17.4, and C 1.56% (Mn:Si = 3.5) which is in U.S.S.R., the common I, (2) Mn 68.6, Si 15.3, and C 0.31% (Mn:Si = 4.5), (3) Mn 73.3, Si 12.16, and C 0.43% (Mn:Si = 6), and (4) Mn 75, Si 10.73, and C 0.46% (Mn:Si = 7). The work was carried out on a bench scale and also in an industrial open-hearth furnace (130 tons). On the industrial-scale the preliminary deoxidation was carried out in one instance with (3) and in another instance with (1). Final deoxidation was carried out with a 45% ferrosilicon and Al. The results of the large scale and bench investigations are in agreement. During the preliminary deoxidation the liquid steel contains isomorphic mixts. of orthosilicates of Ca and Mn of variable compn. The mixt. of the above orthosilicates melts at a relatively lower temp. when (3) is used. The lower melting temp. results in an easier coalescence of O into small bubbles which flow out from the melt. This is why the melt is kept at the melting temp. 20-25 min. after the addn. of I.

P. J. Hendel

MT

SAMARIN, A.M.

SAMARIN, A.M.; YEFIMOV, L.M.; VESELKOV, N.G.; ORMAN, R.Z.; SHABANOV, A.N.; MOROZENSKIY, L.I.; GRANAT, I.Ya.; TOCHINSKIY, A.S.; ALYAVDIN, V.A.; DANILOV, P.M.; PETRIKEYEV, V.I.; POPOV, B.N.; BOBKOV, T.M.; ROSTKOVSKIY, S.Ye.; GAVRISH, D.I.; D'YAKONOV, N.S.; TIMOSHPOL'SKIY, M.N.; ROMANOV, V.D.; POCHTMAN, A.M.; MELESHKO, A.M.; PODGORETSKIY, A.A.; OFENGENDEN, A.M.; BRONSHTEYN, V.M.; PRIDANTSEV, M.V.; LIVSHITS, G.L.; ROZHKOV, V.A.; RUTES, V.S.

Reports (brief annotations). Biul. TSNIICHM no.18/19:15-16 '57.
(MIRA 11:4)

1. Chlen-korrespondent AN SSSR (for Samarin). 2. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Rutes, Rostkovskiy, Pridantsev, Livshits, Rozhkov). 3. Stal'proyekt (for Shabanov). 4. Kuznetskiy metallurgicheskiy kombinat (for Alyavdin, Danilov, Petrikeyev). 5. Zavod "Elektrostal'" (for Popov). 6. "Dneprospetsstal'" (for Bobkov). 7. Glavogneupor Ministerstva chernoy metallurgii SSSR (for Gavrish). 8. Planovoye upravleniye Ministerstva chernoy metallurgii SSSR (for D'yakonov). 9. Otdel rabochikh kadrov, truda i zarplaty Ministerstva chernoy metallurgii SSSR (for Timoshpol'skiy). 10. Glavvtorchermet Ministerstva chernoy metallurgii SSSR (for Romanov). 11. Giprostal' (for Pochtman). 12. Zavod im. Voroshilova (for Meleshko). 13. Zavod "Zaporozhstal'" (for Podgoretskiy). 14. Stalinskiy metallurgicheskiy zavod (for Ofengenden). 15. Nizhne-Tagil'skiy metallurgicheskiy kombinat (for Bronshteyn).

(Steel—Metallurgy)

SAMARIN, A.M

DANIKHELKA, A., doktor, inzh.; MIKHAYLOV, O.A., kand. tekhn. nauk; GONCHARENKO, N.I.; KLIMASENKO, L.S.; OYKS, G.N., prof., doktor tekhn. nauk; SEMENENKO, P.P.; MOROZOV, A.N., prof., doktor tekhn. nauk; GLINKOV, M.A., prof., doktor tekhn. nauk; KAZANTSEV, I.G., prof., doktor tekhn. nauk; KOCHO, V.S., prof., doktor tekhn. nauk; ENEKESH, Sh., kand. tekhn. nauk; MOROZENSKIY, L.I., kand. tekhn. nauk; GURSKIY, G.V.; SPERANSKIY, V.G.; NOVIK, L.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; SHNEYEROV, Ya.A., kand. tekhn. nauk; PAPUSH, A.G., kand. tekhn. nauk; MAZOV, V.F.; SAMARIN, A.M.

Discussions. Biul. TSNIICHM no.18/19:17-35 '57. (MIRA 11:4)

1. Glavnyy staleplavil'shchik Ministerstva metallurgicheskoy promyshlennosti i rudnikov Chekhoslovatskoy respubliki (for Danikhelka). 2. Direktor TSentral'nogo instituta informatsii chernoy metallurgii (for Mikhaylov). 3. Direktor Ukrainskogo instituta metallov (for Goncharenko). 4. Glavnyy staleplavil'shchik Kuznetskogo metallurgicheskogo kombinata (for Klimasenko). 5. Zaveduyushchiy kafedroy metallurgii stali Moskovskogo instituta stali (for Oyks). 6. Zamestitel' glavnogo inzhenera zavoda im. Serova (for Semenenko). 7. Zaveduyushchiy kafedroy metallurgii stali Chelyabinskogo politekhnicheskogo instituta (for Morozov). 8. Zaveduyushchiy kafedroy metallurgicheskikh pechey Moskovskogo instituta stali (for Glinkov). 9. Zaveduyushchiy kafedroy metallurgii stali Zhdanovskogo metallurgicheskogo instituta (for Kazantsev). 10. Zaveduyushchiy kafedroy metallurgii stali Kiyevskogo politekhnicheskogo instituta (for Kocho).

(Continued on next card)

DANIKHELKA, A.---(continued) Card 2.

11. Nachal'nik tekhnicheskogo otdela Ministerstva chernoy metallurgii Vengerskoy Narodnoy Respubliki (for Mnekesh). 12. Zamestitel' direktora Novotul'skogo metallurgicheskogo zavoda (for Gurskiy). 13. Nachal'nik tekhnicheskogo otdela zavoda "Dneprospetsstal' (for Speranskiy). 14. Institut metallurgii im. Baykova AN SSSR (for Novik). 15. Nachal'nik staleplavil'noy laboratorii Ukrainskogo instituta metallov (for Shneyerov). 16. Nachal'nik laboratorii po nepreryvnoy razlivke stali Zhdanovskogo filiala TSentral'nogo nauchno-issledovatel'skogo instituta Ministerstva stroitel'noy promyshlennosti (for Papush). 17. Nachal'nik martenovskogo tsekha zavoda "Zaporozhstal'" (for Mazov). 18. Zamestitel' direktora Instituta metallurgii im. Baykova AN SSSR, chlen-korrespondent AN SSSR (for Samarin).

(Steel--Metallurgy)

SAMARIN, A.M.

DUBROV, N.F., kand. tekhn. nauk; MIKHAYLOV, O.A., kand. tekhn. nauk; FEL'DMAN, I.A.; DANILOV, A.M.; SOROKIN, P.Ya., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; BUTAKOV, D.K., kand. tekhn. nauk, dots.; SOYFER, V.M.; LATASH, Yu.V., mladshiy nauchnyy sotrudnik; ZAMOTAYEV, S.P.; BEYTEL'MAN, A. I.; SAPKO, A.I.; PETUKHOV, G.K., kand. tekhn. nauk; YEDNERAL, F.P., kand. tekhn. nauk, dots.; LAPOTYSHKIN, N.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; ROZIN, R.M.; NOVIK, L.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; LAVRENT'YEV, B.A.; SHILYAYEV, B.A.; SHUTKIN, N.I.; GNUCHEV, S.A., kand. tekhn. nauk, starshiy nauchnyy sotrudnik; LYUDEMAN, K.F., doktor-inzh., prof.; GRUZIN, V.G., kand. tekhn. nauk; BARIN, S.Ya.; POLYAKOV, A.Yu., kand. tekhn. nauk; FEDCHENKO, A.I.; AGEYEV, P.Ya., prof., doktor; SAMARIN, A.M.; BOKSHITSKIY, Ya.M., kand. tekhn. nauk; GARNYK, G.A., kand. tekhn. nauk; MARKARYANTS, A.A., kand. tekhn. nauk; KRAMAROV, A.D., prof., doktor tekhn. nauk; TEDER, L.I.; DANILOV, P.M.

Discussions. Biul. TSNIICHM no.18/19:69-105 '57. (MIRA 11:4)

1. Direktor Ural'skogo instituta chernykh metallov (for Dubrov). 2. Direktor TSentral'nogo instituta informatsii chernoy metallurgii (for Mikhaylov). 3. Nachal'nik nauchno-issledovatel'skogo otdela osobogo konstruktorskogo byuro tresta "Elektropech'" (for Fel'dman). 4. Nachal'nik martenovskoy laboratorii Zlatoustovskogo metallurgicheskogo zavoda (for Danilov, A.M.). 5. Laboratoriya protsessov stalevareniya Instituta metallurgii Ural'skogo filiala AN SSSR (for Sorokin).

(Continued on next card)

DUBROV, N.F.---(continued) Card 2.
6. Ural'skiy politekhnicheskiy institut (for Butakov). 7. Starshiy inzhener Bryanskogo mashinostroitel'nogo zavoda (for Soyfer). 8. Institut elektrosvarki im. Patona AN URRS (for Latash). 9. Nachal'nik TSentral'noy zavodskoy laboratorii "Uralmashzavoda" (for Zamotayev). 10. Dnepropetrovskiy metallurgicheskiy institut (for Sapko). 11. Moskovskiy institut stali (for Yedneral). 12. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Gnuchev, Lapotyshkin). 13. Starshiy master Leningradskogo zavoda im. Kirova (for Rozin). 14. Institut metallurgii im. Baykova AN SSSR (for Novik, Polyakov, Garnyk). 15. Nachal'nik tekhnicheskogo otdela zavoda "Bol'shevik" (for Lavrent'yev). 16. Starshiy inzhener tekhnicheskogo otdela Glavspetsstali Ministerstva chernoy metallurgii (for Shilyayev). 17. Zamestitel' nachal'nika tekhnicheskogo otdela zavoda "Elektrostal'" (for Shutkin). 18. Freybergskaya gornaya akademiya, Germanskaya Demokraticheskaya Respublika (for Lyudeman). 19. Zaveduyushchiy laboratoriyey stal'nogo lit'ya TSentral'nogo nauchno-issledovatel'skogo instituta tekhnologii i mashinostroyeniya (for Gruzin). 20. Starshiy master elektrostaleplavil'nykh pechey Uralvagonzavoda (for Barin). 21. Zamestitel' nachal'nika elektrostaleplavil'nogo tsekha zavoda "Sibelektrostal'" (for Fedchenko). 22. Zaveduyushchiy kafedroy metallurgii stali i elektrometallurgii chernykh metallov Leningradskogo politekhnicheskogo instituta (for Ageyev). 23. Zamestitel' direktora Instituta metallurgii im. Baykova AN SSSR, chlen-korrespondent AN SSSR (for Samarin).

(Continued on next card)

DUBROV, N.F.---(continued) Card 3.
24. Nachal'nik laboratorii TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii (for Bokshitskiy). 25. Zaveduyushchiy kafedroy elektrometallurgii Sibirskogo metallurgicheskogo instituta (for Kramarov). 26. Nachal'nik elektrostaleplavil'nogo tsekha Kuznetskogo metallurgicheskogo kombinata (for Teder). 27. Nachal'nik elektrometallurgicheskoy laboratorii Kuznetskogo metallurgicheskogo kombinata (for Danilov, P.M.).
(Steel--Metallurgy)

SOV/137-58-8-16524

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 42 (USSR)

AUTHOR: Samarin, A.M.

TITLE: Theory and Prospects of the Employment of Vacuum in Steel-smelting Processes (Teoreticheskiye osnovy i perspektivy primeneniya vakuuma v staleplavil'nykh protsessakh)

PERIODICAL: Tr. Nauchno-tekhn. o-va chernoy metallurgii, 1957, Vol 18, pp 19-39

ABSTRACT: The reducing capacity of C increases when smelting is performed under vacuum (V). In addition to thermodynamic characteristics of the reaction between C and O_2, the process of decarburization of liquid steel in V is governed by other factors. The pressure within a CO bubble which forms in liquid metal is expressed by the following equation: $P_b = P_a + \gamma_{Fe} h \;\; 2\sigma/r$, where P_a is the atmospheric pressure; γ_{Fe} the density of liquid Fe; h the height of the column of liquid metal (above the bubble); σ the surface tension of liquid Fe; r the radius of the forming bubble. Under V, the reducing capacity of C is influenced by the hydrostatic pressure and by the

Card 1/2

SOV/137-58-8-16524

Theory and Prospects of the Employment of Vacuum (cont.)

size of the gas bubble. Numerical values of partial pressures of CO are given for the process of reduction of Al_2O_3, MgO, and ZrO_2 at a temperature of 1627°C. A reduction in oxygen content in liquid steel facilitates the removal of S from the metal. As the product (% conc. of C)·(% conc. of O) diminishes during smelting of transformer steel in a vacuum furnace, the ratio (% conc. of S)/(% conc. of O) increases. Conditions necessary for removal of H and N from vacuum-smelted steel are examined. If the content of N in low-chromium steel is not to exceed 0.001%, the partial pressure of N_2 must be reduced to 0.01 mm Hg. H escapes from the hearth more rapidly than the N, a condition attributable to a greater coefficient of diffusion of H in liquid steel. The employment of vacuum induction and arc furnaces for smelting of special steels and alloys is considered. Results of the evacuation of ladles containing liquid steel, as well as vacuum casting of steel are discussed. It is pointed out that desulfurization may be carried out under V. By maintaining liquid cast iron under vacuum on the order of 0.1 mm Hg, the S content is reduced from 0.05 to 0.006-0.008%. A system is proposed whereby cast iron is desulfurized by passing through a vacuum device immediately after it has been discharged from a blast furnace. The employment of V in the production of Fe alloys permits the manufacture of Fe-Cr that contains <0.03% of C. 1. Steel--Production 2. Vacuum furnaces--Theory 3. Vacuum furnaces --Performance

Card 2/2

B.L.

BELYAKOV, R.S., inzh.; SAMARIN, A.M.

Effect of smelting processes on stainless steel properties. Biul. TSNIICHM no.21:8-14 '57. (MIRA 11:5)

1. Chlen-korrespondent AN SSSR (for Samarin).
(Steel, Stainless--Metallurgy)

SAMARIN, A.M.

20-1-26/64

AUTHOR: BUZHEK, Z., SAMARIN, A., Corresponding Members of the Academy of Science of the U.S.S.R.

TITLE: The Influence Exercised by Sulphur upon the Solubility of Oxygen in Liquid Iron. (Vliyaniye sery na rastvorimost' kisloroda v zhidkom zheleze, Russian)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 114, Nr 1, pp 97-98 (U.S.S.R.)

ABSTRACT: In the course of the investigation of the process of disulphurization it was found that deacidification and disulphurization take place at one and the same time. The influence exercised by sulphur on the solubility of oxygen in liquid iron was investigated at 1550° and 1600°. As a result of the investigation it was found that sulphur exercises no influence on solubility as is shown by a graph. The dependence of solubility on the temperature in the molten iron-sulphur is expressed with sufficient clearness by the following equation:

$$\lg (\%O) = -\frac{6320}{T} + 2{,}734.$$ (Wit 5 References).

ASSOCIATION: Not given

PRESENTED BY:

SUBMITTED:

AVAILABLE: Library of Congress

Card 1/1

SAMARIN, A. M. and KARASEV, R. A.

"Mechanism of Gas Removal from Liquid Metal in Vacuum."

"Some Properties of Vacuum Treated Bessemer Steel."

papers submitted at Fifth National Vacuum Technology Symposium, San Francisco, Calif., 22-24 Oct 1958.

Comments, B- 3,118,070

KASHIN, V. I., SAMARIN, A. M.
Inst. of Meallurgy im. Baykov.

"Vacuum Induction Melting of the High Temperature Alloys."

Paper presented at Second Symposiium on the Application of Vacuum in Metallurgy.

Moscow - July 1958

BURTSEV, V. T., KARASSEV, R. A. and SAMARIN, A. M.
"Institute of Metallurgy im. A. A. Baykov.

"Vacuum Desulphurization of the Liquid Iron Alloys."

paper presented at Second Symposium on the Application of Vacuum Metallurgy.

Moscow - July 1958

NOVIK, L. M., LUKUTIN, A. I. and SAMARIN, A. M.
"Inst. Metallurgy im. A. A. Baykov.

"Vacuum Treatment of Bessemer Steel."

paper presented at Second Symposium on the Application of Vacuum Metallurgy.

Moscow - July 1958

LINCHEVSKIY, D. V. and SAMARIN, A. M.
Inst. of Metallurgy im. Baykov, Moscow

"Vacuum Melting of Stainless Steel."

paper presented at Second Symposium on the Application of Vacuum in Metallurgy."

Moscow, July 1958

GARNYK, G. A. and SAMARIN, A. M.
Inst. of Metallurgy Im. Baykov, Moscow

"Influence of Silicon and Completeness of Liquid Metal Decarburization in the Vacuum Induction Furnace."

paper presented at Second Symposium on the Application of Vacuum in Metallurgy.

Moscow, July 1958

OKOROKOV, G. N., POLYAKOV, A. Yu. and SAMARIN, A. M.
Inst. of Metallurgy im Baykov, Moscow.

SAMARIN, A. M.

"Consumbable Electrode Arc Meltting of Ball-bearing Steels."

paper presented at Second Symposium on the Application of Vacuum in Metallurgy.

Moscow, July 1958

MAKUNIN, M. S., POLYAKOV, A. Yu., SAMARIN, A. M.
Institute Metallurgy im. A. A. Baykov.

SAMARIN, A.M.

"Properties of Vanadium Obtained by Carbon Reduction in Vacuum."

paper presented at Second Symposium on the Application of Vacuum Metallurgy.

Moscow, July 1958

SAMARIN, A. M.

DRIVING, N. Ya., KARASSEV, R. A. and SAM ARIN, A. M.
Institute of Metallurgy im. A. A. Baykov, Moscow

"Application of the Mass-Spectrometer to Investigation of the Liquid Steel Decarbonization Kinetics in Vacuum."

paper presented at Second Symposium on the Application of Vacuum Metallurgy.

Moscow, July 1958

18(5) PHASE I BOOK EXPLOITATION SOV/1763

Samarin, Aleksandr Mikhaylovich

Vakuumnaya metallurgiya (Vacuum Metallurgy) Moscow, Metallurgizdat, 1958. 35 p. 4,665 copies printed.

Ed. of Publishing House: A. I. Lebedev; Tech. Ed.: I. M. Evenson.

PURPOSE: This booklet is intended for metallurgical engineers.

COVERAGE: The booklet gives brief descriptions of methods for vacuum-melting metals and alloys and for vacuum-treating liquid steel. On the basis of investigations and the practical experience of Soviet metallurgical plants, comparative data are presented which reflect the quality of metal obtained both by vacuum and non-vacuum methods. Problems in the field and prospects for future development are discussed. There are 11 references, of which 10 are Soviet and 1 English.

Card 1/2

SAMARIN, A.M.

SAMARIN, A.M., otvetstvennyy red.; BANKVITSER, A.L., red.izd-va; POLYAKOVA, T.V., tekhn.red.

[Using vacuum in metallurgy; transactions of the conference] Primenenie vakuuma v metallurgii; trudy soveshchaniia. Moskva, Izd-vo Akad.nauk SSSR, 1958. 165 p. (MIRA 11:3)

1. Soveshchaniye po primeneniyu vakuuma v metallurgii. Moscow, 1956. 2. Chlen-korrespondent AN SSSR (for Samarin)
(Vacuum metallurgy)

CHIZHEVSKIY, Nikolay Prokop'yevich, akad.; KUSAKIN, N.D., kand. tekhn. nauk,; BARDIN, I.P., akad., otv. red.; SAMARIN, A.M., red. SYSKOV, K.I., doktor tekhn. nauk, red.; TSYLEV, L.M., doktor tekhn. nauk, red.; SHAPOVALOV, I.K., red.izd-va,; PRUSAKOVA, T.A., tekhn. red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad. nauk SSSR. Vol. 1. 1958. 439 p. (MIRA 11:11)

1. Chlen-korrespondent AN SSSR(for Samarin)
(Metallurgy)
(Coke)
(Fuel)

CHIZHEVSKIY, Nikolay Prokop'yevich, akademik; KUSAKIN, N.D., kand.tekhn. nauk, sostavitel' toma; BARDIN, I.P., akademik; SAMARIN, A.M.; SYSKOV, K.I., doktor tekhn.nauk; TSYLEV, doktor tekhn.nauk; CHERNYSHEV, D.M., red. izd-va; PRUSAKOVA, T.A., tekhn.red.

[Selected works] Izbrannye trudy. Moskva, Izd-vo Akad. nauk SSSR. Vol.2. 1958. 425 p. (MIRA 12:1)

1. Chlen-korrespondent AN SSSR (for Samarin).
(Coke) (Metallurgy)

BARDIN, I.P., akademik, otv.red.; STRUMILIN, S.G., akademik, red.; SHEVYAKOV, L.D., akademik, red.; SHCHERBAKOV, D.I., akademik, red.; ANTIPOV, M.I., red.; BELYANCHIKOV, K.P., red.; BRODSKIY, V.B., red.; YEROFEYEV, B.N., red.; LIBERMAN, A.Ya., red.; MELESHKIN, S.M., red.; ORLOV, I.V., red.; SMIRNOV-VERIN, S.S., red.; RIKMAN, V.V., red.; SAMARIN, A.M., red.; SLEDZYUK, P.Ye., red.; SKOBNIKOV, M.L., red.; SOKOLOV, G.A., red.; FREY, V.I., red.; KHLEBNIKOV, V.B., red.; SHAPIRO, I.S., red.; SHIRYAYEV, P.A., red.; KUDASHEV, A.I., red.izd-va; KUZ'MIN, I.F., tekhn.red.

[Magnetite ores of the Kustanay Province and their exploitation] Magnetitovye rudy Kustanaiskoi oblasti i puti ikh ispol'zovaniia. Otvetstvennyi red. I.P. Bardin. Moskva, Izd-vo Akad. nauk SSSR, 1958. 489 p. (Zhelezorudnye mestorozhdeniia SSSR). (MIRA 12:2)

1. Russia (1923- U.S.S.R.) Ministerstvo geologii i okhrany nedr.
(Kustanay Province--Magnetite)

Samarin, A.M.

KURDYUMOV, G.V., otvetstvennyy red.; SAMARIN, A.M., red.; SHVARTSMAN, L.A., red.; MALKIN, V.I., red.; GOLIKOV, V.M., red.; RABEZOVA, V.A., red.; CHERNOV, A.N., red.izd-va; SIMKINA, Ye.N., tekhn.red.; KASHINA, P.S., tekhn.red.

[Metallurgy and physical metallurgy proceedings of the Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and in Science] Metallurgiia i metallovedenie; trudy Vsesoiuznoi nauchno-tekhnicheskoi konferentsii po primeneniiu radioaktivnykh i stabil'nykh izotopov i izluchenii v narodnom khoziaistve i nauke. Moskva, Izd-vo Akad. nauk SSSR, 1958. 518 p. (MIRA 11:6)

1. Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po primeneniyu radioaktivnykh i stabil'nykh izotopov i izluchenii v narodnom khozyaystve i nauke. 1957.
(Metallurgy) (Physical metallurgy)

SAMARIN, A. M.

18(0) PHASE I BOOK EXPLOITATION SOV/1728

Akademiya nauk SSSR. Institut metallurgii

Sovremennyye problemy metallurgii (Modern Problems in Metallurgy) Moscow, Izd-vo AN SSSR, 1958. 640 p. 3,000 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Eds. of Publishing House: V.S. Rzhevnikov, and A.N. Dernov; Tech. Ed.: T.V. Polyakova.

PURPOSE: This book is intended for scientific and technical personnel in the field of metallurgy.

COVERAGE: This is a collection of articles on certain aspects of Soviet metallurgy. The book is dedicated to Academician Ivan Pavlovich Bardin on the occasion of his 75th birthday. The book is divided into seven parts. The first part consists of two articles presenting a brief account of the biography and professional activity of the Soviet metallurgist. It includes an article by John Chipman, Nicholas Grant, and John Elliott (M.I.T., USA) describing their meeting with Bardin in Moscow and also his visit to the United States. The second part consists of three articles and deals with raw materials and fuels for the Soviet metallurgical industry. The third part represents the major portion of the book. It consists of 25 articles dealing with the various aspects of the metallurgy of pig iron and steel. The fourth part consists of two articles treating the metallurgy of nonferrous metals. The fifth part consists of three articles on the forming of metals. The sixth part consists of eight articles discussing certain aspects of physical metallurgy. The last part deals with general problems in the field of metallurgy. References are given after each article. No personalities are mentioned.

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SOV/1728

Modern Problems in Metallurgy

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SAMARIN, A.M.

LEONIDOV, N.K.

18(5) PHASE I BOOK EXPLOITATION SOV/1497

Akademiya nauk SSSR. Institut nauchnoy i tekhnicheskoy informatsii

Metallurgiya SSSR, 1917-1957, t. 1 (Metallurgy of the USSR, 1917 - 1957, Vol. 1) Moscow, Metallurgizdat, 1958. 745 p. 3,000 copies printed.

Ed. (Title page): I. P. Bardin, Academician; Ed. (Inside book): G. V. Popova; Tech. Ed.: O. G. Bekker.

PURPOSE: The book is intended for scientific workers and engineers in metallurgical plants and in the machine-building industry. It may also be used by students in advanced courses in metallurgical vuzes.

COVERAGE: This collection of articles covers extensively practical and theoretical developments in Soviet metallurgy during the last 40 years. The material deals with the discovery and development of the major ore deposits and the growth of the metal industry in various parts of European and Asiatic USSR. Research institutes, laboratories, their location, and the names of the scientists and engineers involved are listed. Many papers contain so many references and names of various personalities that it was considered beyond the scope of the coverage of each article to list them. The authors claim that the processes, methods and theories described in this book reflect the most recent developments in Soviet metallurgy.

Card 1/41

Metallurgy of the USSR (Cont.) SOV/1497

Tsylev, L.M., and M.Ya. Ostroukhov. Development in the USSR of the Theory of Blast Furnace Process 147

The article deals with the design and operation of very large blast furnaces with 950 to 1300 cubic meter capacity. A number of experiments were carried out to study the operating regimes in those furnaces. The physical and chemical characteristics of the charge were studied to obtain optimum results and to insure free travel of the charge in the furnace and the permeability of the charge to gases. The thermal reactions were investigated and the results graphed. Reduction and slag formation as well as the combustion process proper were the object of intensive studies. The need for the proper control of blast furnace operation is stressed. It is claimed that at present Soviet scientists are attempting to develop a fully automated system for blast furnace operation which will automatically compensate for the variables involved in the process. There are 46 Soviet and 3 English references.

Polyakov, A.Yu., and A.M. Samarin. The Rise of Steel Production in the USSR 187

The article contains a review of the Soviet steel industry. Production figures for the Five Year Plans are given. The use of oxygen blowing in the production of converter steel is regarded as an important develop-

Metallurgy of the USSR (Cont.) SOV/1497

ment. A marked increase in the production of alloyed steel is scheduled for 1960. The development of automated processes in foundries is advocated. There are 4 Soviet references.

Polyakov, A.Yu., and A.M. Samarin. Development of the Theoretical Principles of Steel Making 3?

Soviet scientists are reported to have done extensive theoretical studies of the physical and chemical processes which take place in the liquid stage of steel making. Reaction between oxygen and carbon in the steel bath has been the subject of numerous studies. The thermodynamic and

Metallurgy of the USSR (Cont.) SOV/1497

kinetic behavior of slags and metal has also been studied. The present trend is to apply new scientific achievements in physics and electronics to control and check steel making processes by a fully automatic system on an industrial scale. There are 30 Soviet references.

SOV/137-59-1-357

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 44 (USSR)

AUTHOR: Samarin, A. M.

TITLE: Problems in the Employment of Vacuum in Metallurgical Operations (Problemy ispol'zovaniya vakuuma v metallurgii)

PERIODICAL: V sb.: Primeneniye vakuuma v metallurgii. Moscow, AN SSSR, 1958, pp 3-13

ABSTRACT: The gas content of a metal may be significantly reduced if the smelting is performed in vacuum furnaces. During vacuum smelting of transformer steel, the value of the product [%C]·[%O] ranges from 2×10^{-5} to 7×10^{-5}, whereas during smelting of metal conducted in air it is equal to 0.0025. Continuous-action vacuum induction furnaces are described. The interaction between the refractory lining and the liquid metal occurring during smelting of stainless steel is examined. It is pointed out that it is imperative that furnaces be designed with an "auto-crucible" which would preclude any possibility of contact between the liquid metal and the refractories. A method of treating steel in a ladle is described, together with a procedure for processing of Fe-Cr in vacuum. Data on corrosion resistance of

Card 1/2

SOV/137-59-1-357

Problems in the Employment of Vacuum in Metallurgical Operations

vacuum-smelted stainless steel are presented.

B. L.

Card 2/2

SOV/24-58-5-10/31

AUTHORS: Okorokov, G. N., Polyakov, A. Yu. and Samarin, A.M. (Moscow)

TITLE: Repeated Meltings of Steel and Alloys in an Arc-Vacuum Furnace (Pereplav stali i splavov v dugovoy vakuumnoy pechi)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 5, pp 59-62 (USSR)

ABSTRACT: A considerable reduction of gas contents and non-metallic impurities in steel and alloys has been obtained by remelting in a special arc-vacuum furnace constructed in the Metallurgical Institute of the Ac.Sc. USSR, a sketch of which is shown on p 60. Ten remeltings of ball-bearing steel under 1×10^{-1} mm pressure of mercury at the rate of 0.6 kg/min resulted in a reduction of oxide and sulphide contents by 40-50%. The same steady 40-50% reduction of oxides and sulphides has been obtained after a series of remeltings (under 1×10^{-3} to 1×10^{-4} mm pressure) of steel, previously rejected because of its high contents of non-metallic impurities. After remeltings it proved in many ways superior to the steel specially selected for ball-

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bearing production. Similarly, heat resisting nickel alloys, after four remeltings in the arc-vacuum furnace (at the rate of 0.5 to 0.55 kg/min) had a surface of good quality and a high homogeneity, without the undercrust porosity peculiar to titanium containing alloys. No change in the chemical composition took place as a result of the evaporation in vacuum, except that the contents of oxygen were reduced by 50-70%, that of nitrogen by 25-30%; the carbon content remained unchanged. Similar results have been obtained with stainless steel, remelted at the rate of 0.6 kg/min under 1×10^{-3} and 1×10^{-4} mm pressure, applying a current intensity of 1500 A.

There are 5 tables, 1 figure and 1 Soviet reference.

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AUTHORS: Vertman, A. A., Samarin, A. M. (Moscow)

TITLE: Magnetic Analysis of Molten Iron Base Alloys (Magnitnyy analiz zhidkikh splavov na osnove zheleza)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 10, pp 100-103 (USSR)

ABSTRACT: Although a great deal of information about the behaviour of solid alloys is available, it is not known why this behaviour deviates from the ideal. The basic method for studying the structure of a melt is X-ray analysis, but again it is liable to misinterpretations in the case of the structure of molten alloys. The electrondiffraction study of thin liquid films has an advantage over the X-ray method, its limitation being that the structure of thin films differs from the structure of larger quantities of molten alloys. Some results of magnetic susceptibility tests of molten metallic alloys by the Faraday method are given. All the tests were carried out in an argon atmosphere; the field strength for alloys of the same system was kept strictly constant. Fig.1 gives the isotherm of the magnetic susceptibility of molten alloys of the Fe-Si system at 1600°C. Measurements were taken during cooling from 1700°C. In this system a number of strong chemical

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compounds form. The strongest is FeSi which, according to N. Kh. Abrikosov (Ref.6), exists in the corresponding alloy even in its molten state. It can be seen from Fig.1 that the magnetic susceptibility depends essentially on the composition. The minimum magnetic susceptibility exists in molten alloys corresponding in composition to the chemical compounds Fe_2Si, Fe_3Si_2, FeSi and $FeSi_2$. Study of the Fe-Si system has shown that a definite degree of order is preserved in molten alloys corresponding in their composition to chemical compounds, even on considerable super-heating above the liquidus line. Not only is it possible for the molten alloys to retain their structures, but they also form definite structures in the molten state which differ from the fully molecular mixing. In order to prove this, the iron-cobalt system was studied, the thermal equilibrium diagram and magnetic susceptibility isotherm at 1600°C of which are given in Fig.2. It can be assumed that the structure of molten alloys containing up to 40% cobalt does not differ from the

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structure of pure iron. At a cobalt content of 40 to 45% a sharp increase in magnetic susceptibility occurs. This points to the appearance in the melt of a weaker structure. This increase in magnetic susceptibility appears to be associated with the transformation of the melt from the δ-Fe structure to the structure of molten cobalt. The same applies to alloys of the Fe-Ni system. Such a sharp change in the properties of a melt corresponds with a change in structure of the near order. The change in structure of liquid alloys also influences the chemical behaviour. It has been shown by Averin et al (Ref.13) that when oxygen is dissolved in liquid alloys of the systems Fe-Ni and Fe-Co considerable deviation from the Henry law is observed. This deviation reaches a maximum in that concentration range where a sharp change in magnetic properties is evident. The energy of the atomic bonds in these regions is different from those in other structural regions. The atoms form complexes and the structure of these complexes in the Fe-Co system changes in the region of 40 to 50% Co. A change in structure in a solution appears to take place only when the alloy consists of components of different lattices. There is no change in structure in alloys consisting of components with identical lattices (Ni and Co) and the

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